AMENDED CLAIMS

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1. A neurovascular array for use with a magnetic resonance (MR) system capable of parallel-imaging via a plurality of processing channels, the neurovascular array comprising:

(a) a head coil having:

(I) a first electrically conductive ring,

(II) a second electrically conductive ring, and

(III) a plurality of rods electrically interconnecting said first and said second rings to form a birdcage-like structure therewith,

wherein said rods and said first and said second rings are configured to produce a plurality of electrically-adjacent primary resonant substructures about the birdcage-like structure, with each of said primary resonant substructures:

(A) constituting a coil element including two of said rods neighboring each other and a corresponding short segment of each of said first and said second rings interconnecting them while electrically sharing one of said rods with each of its neighboring primary resonant substructures, so that each of said primary resonant substructures is enabled to receive magnetic resonance signals from tissue within a separate field of view thereof, and

(B) providing a source impedance considerably higher than a load impedance to which said primary resonant substructure connects for creating a resonant circuit therewith so as to enable said primary resonant substructure (i) to be operatively couplable to one processing channel of the MR system for conveyance of the magnetic resonance signals received thereby (ii) while

simultaneously being at least partially decoupled from the other of said primary resonant substructures of said head coil;

(b) an anterior coil having in proximity to said head coil at least one other coil element for receiving magnetic resonance signals from tissue within a separate field of view thereof;

(c) a posterior coil having in proximity to said head coil at least one other coil element for receiving magnetic resonance signals from tissue within a separate field of view thereof; and

(d) an interface for enabling said coil elements of said head coil, said anterior coil and said posterior coil to be selectively interconnected to the processing channels of the MR system so that the neurovascular array can be selectively operated in a plurality of modes.

2. The neurovascular array of claim 1 wherein said plurality of modes includes a neurovascular phased array mode in which said interface enables:

(a) each pair of said coil elements of said head coil to be interconnected with a separate one of the processing channels of the MR system; and

(b) each of said other coil elements of said anterior and said posterior coils to be interconnected with a separate one of the processing channels of the MR system.

3. The neurovascular array of claim 2 wherein said head coil has eight of said coil elements and said anterior and said posterior coils each have two of said other coil elements, for use with the MR system equipped with at least eight of the processing channels.

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4. The neurovascular array of claim 1 wherein said plurality of modes includes a high resolution brain mode in which said interface enables each of said coil elements of said head coil to be interconnected with a separate one of the processing channels of the MR system.

5. The neurovascular array of claim 1 wherein said plurality of modes includes a volume neck mode in which said interface enables each of said other coil elements of said anterior and said posterior coils to be interconnected with a separate one of the processing channels of the MR system.

6. The neurovascular array of claim 1 wherein said plurality of modes includes a spectroscopy mode in which said interface enables all of said coil elements of said head coil to be interconnected with a single one of the processing channels of the MR system.

7. The neurovascular array of claim 1 wherein said interface is capable of enabling said neurovascular array to be selectively operated in said plurality of modes when said coil elements of said head coil, said anterior coil and said posterior coil are greater in number than the processing channels of the MR system.

8. The neurovascular array of claim 1 wherein each of said primary resonant substructures as said source impedance includes an input resonant circuit for enabling said primary resonant substructure via a low impedance preamplifier as said load impedance to be (i) operatively couplable to one processing channel of the MR system and (ii) at least partially decoupled from the other of said primary resonant substructures.

9. The neurovascular array of claim 8 wherein said low impedance preamplifiers are provided as part of the neurovascular array.

10. The neurovascular array of claim 8 wherein each of said low impedance preamplifiers is provided with one of the processing channels of the MR system.

11. The neurovascular array of claim 8 wherein each of said primary resonant substructures has said input resonant circuit corresponding thereto located in one of said short segment of said second ring thereof and said short segment of said first ring thereof.

12. The neurovascular array of claim 1 wherein each of said primary resonant substructures further includes at least one of:

(a) a tuning circuit in at least one of said rods thereof;

(b) a tuning circuit in said short segment thereof of said first ring; and

(c) a tuning circuit in said short segment thereof of said second ring;

for enabling said head coil to be tuned according to an offset tuning scheme through which each of said primary resonant substructures is (i) further decoupled from the other of said primary resonant substructures and (ii) still enabled to resonate at an operating frequency of said head coil and thus to receive the magnetic resonance signals.

13. The neurovascular array of claim 8 wherein each of said primary resonant substructures further includes at least one of:

(a) a tuning circuit in at least one of said rods thereof;

(b) a tuning circuit in said short segment thereof of said first ring; and

(c) a tuning circuit in said short segment thereof of said second ring;

for enabling said head coil to be tuned according to an offset tuning scheme through which each of said primary resonant substructures is (i) further decoupled from the other of said primary resonant substructures and (ii) still enabled to resonate at an operating frequency of said head coil and thus to receive the magnetic resonance signals.

14. The neurovascular array of claim 1 wherein said second ring of said head coil has a diameter that is smaller than that of said first ring of said head coil.

15. The neurovascular array of claim 1 wherein said plurality of electrically-adjacent primary resonant substructures of said head coil is eight in number, with each being generally deployed 45 degrees apart from its neighbor.

16. The neurovascular array of claim 15 wherein:

(a) a first group of four of said primary resonant substructures have said rods thereof spaced approximately 60 degrees apart in each of said primary resonant substructures; and

(b) a second group of four of said primary resonant substructures have said rods thereof spaced approximately 30 degrees apart in each of said primary resonant substructures;

with said primary resonant substructures of said first and said second groups being deployed in alternating fashion.

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17. The neurovascular array of claim 1 wherein said primary resonant substructures of said head coil are deployed generally symmetrically about the birdcage-like structure.

18. The neurovascular array of claim 1 wherein selected ones of said rods of said head coil are spaced at irregular distances from adjacent ones of said rods.

19. The neurovascular array of claim 1 wherein each of said rods includes a decoupling network therein for decoupling said head coil from a radio frequency transmit field of the MR system during a transmit cycle thereof.

20. The neurovascular array of claim 19 wherein each of said decoupling networks includes an active decoupling circuit and a passive decoupling circuit.

21. A volume coil for use with a parallel-imaging compatible magnetic resonance (MR) system, the volume coil comprising:

(a) a first electrically conductive ring;

(b) a second electrically conductive ring;

(c) a plurality of rods electrically interconnecting said first and said second rings to form a birdcage-like structure therewith;

wherein said rods and said first and said second rings are configured to produce a plurality of electrically-adjacent primary resonant substructures about the birdcage-like structure, with each of said primary resonant substructures including two of said rods neighboring each other and a corresponding short segment of each of said first and said second

rings interconnecting them while electrically sharing one of said rods with each of its neighboring primary resonant substructures, so that each of said primary resonant substructures is enabled to receive magnetic resonance signals from tissue within a separate field of view thereof; and

(d) each of said primary resonant substructures having a source impedance considerably higher than a load impedance to which said primary resonant substructure connects for creating a resonant circuit therewith so as to enable said primary resonant substructure (i) to be operatively couplable to one processing channel of the MR system in order to convey the magnetic resonance signals received thereby (ii) while simultaneously being at least partially decoupled from the other of said primary resonant substructures of the volume coil.

22. The volume coil of claim 21 wherein each of said primary resonant substructures as said source impedance includes an input resonant circuit for enabling said primary resonant substructure via a low impedance preamplifier as said load impedance to be (i) operatively couplable to one processing channel of the MR system and (ii) at least partially decoupled from the other of said primary resonant substructures.

23. The volume coil of claim 22 wherein said low impedance preamplifiers are provided as part of the volume coil.

24. The volume coil of claim 22 wherein each of said low impedance preamplifiers is provided with one of the processing channels of the MR system.

25. The volume coil of claim 22 wherein each of said primary resonant substructures has said input resonant circuit corresponding thereto located in one of said short segment of said second ring thereof and said short segment of said first ring thereof.

26. The volume coil of claim 21 wherein each of said primary resonant substructures further includes at least one of:

(a) a tuning circuit in at least one of said rods thereof;

(b) a tuning circuit in said short segment thereof of said first ring; and

(c) a tuning circuit in said short segment thereof of said second ring;

for enabling the volume coil to be tuned according to an offset tuning scheme through which each of said primary resonant substructures is (i) further decoupled from the other of said primary resonant substructures and (ii) still enabled to resonate at an operating frequency of the volume coil and thus to receive the magnetic resonance signals.

27. The volume coil of claim 22 wherein each of said primary resonant substructures further includes at least one of:

(a) a tuning circuit in at least one of said rods thereof;

(b) a tuning circuit in said short segment thereof of said first ring; and

(c) a tuning circuit in said short segment thereof of said second ring;

for enabling the volume coil to be tuned according to an offset tuning scheme through which each of said primary resonant substructures is (i) further decoupled from the other of said primary resonant substructures and (ii) still enabled to resonate at an operating frequency of the volume coil and thus to receive the magnetic resonance signals.

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28. The volume coil of claim 21 further including a combiner circuit for combining the magnetic resonance signals received by one of said primary resonant substructures with those received by at least one other of said primary resonant substructures and operatively coupling the magnetic resonance signals to one processing channel of the MR system.

29. The volume coil of claim 21 wherein said second ring has a diameter that is smaller than that of said first ring.

30. The volume coil of claim 29 wherein each of said rods has a linear portion and a tapered portion with said linear portion being connected to said first ring and said tapered portion being connected to said second ring.

31. The volume coil of claim 21 wherein said second ring has a diameter that is equal to that of said first ring.

32. The volume coil of claim 21 wherein said first and said second rings are one of circular and elliptical.

33. The volume coil of claim 21 wherein said plurality of electrically-adjacent primary resonant substructures is eight in number, with each being generally deployed 45 degrees apart from its neighbor.

34. The volume coil of claim 33 wherein:

(a) a first group of four of said primary resonant substructures have said rods thereof spaced approximately 60 degrees apart in each of said primary resonant substructures; and

(b) a second group of four of said primary resonant substructures have said rods thereof spaced approximately 30 degrees apart in each of said primary resonant substructures;

with said primary resonant substructures of said first and said second groups being deployed in alternating fashion.

35. The volume coil of claim 21 wherein said primary resonant substructures are deployed generally symmetrically about the birdcage-like structure.

36. The volume coil of claim 21 wherein selected ones of said rods are spaced at irregular distances from adjacent ones of said rods.

37. The volume coil of claim 21 wherein each of said rods includes a decoupling network therein for decoupling the volume coil from a radio frequency transmit field of the MR system during a transmit cycle thereof.

38. The volume coil of claim 37 wherein each of said decoupling networks includes an active decoupling circuit and a passive decoupling circuit.

39. A neurovascular array for use with a magnetic resonance (MR) system having a plurality of processing channels, the neurovascular array comprising:

(a) a head coil including:

(I) a first electrically conductive ring;

(II) a second electrically conductive ring; and

(II) a plurality of rods electrically interconnecting said first and said second rings to form a birdcage-like structure therewith;

wherein said rods and said first and said second rings are configured to produce a plurality of electrically-adjacent primary resonant substructures about the birdcage-like structure, with each of said primary resonant substructures constituting a coil element including two of said rods neighboring each other and a corresponding short segment of each of said first and said second rings interconnecting them while electrically sharing one of said rods with each of its neighboring primary resonant substructures, so that said primary resonant substructures are isolated from each other via a preamplifier decoupling scheme and an offset tuning scheme thereby enabling each of said primary resonant substructures (i) to receive magnetic resonance signals from tissue within a separate field of view thereof and (ii) to be operatively couplable to one processing channel of the MR system in order to convey the magnetic resonance signals received thereby (iii) while being simultaneously decoupled from the other of said primary resonant substructures;

(b) an anterior coil having in proximity to said head coil at least one other coil element for receiving magnetic resonance signals from tissue within a separate field of view thereof;

(c) a posterior coil having in proximity to said head coil at least one other coil element for receiving magnetic resonance signals from tissue within a separate field of view thereof; and

(d) an interface for enabling said coil elements of said head coil, said anterior coil and said posterior coil to be selectively interconnected to the processing channels of the MR system so that the neurovascular array can be selectively operated in a plurality of modes.

40. The neurovascular array of claim 39 wherein said plurality of modes includes a neurovascular phased array mode in which said interface enables:

(a) each pair of said coil elements of said head coil to be interconnected with a separate one of the processing channels of the MR system; and

(b) each of said other coil elements of said anterior and said posterior coils to be interconnected with a separate one of the processing channels of the MR system.

41. The neurovascular array of claim 40 wherein said head coil has eight of said coil elements and said anterior and said posterior coils each have two of said other coil elements, for use with the MR system equipped with at least eight of the processing channels.

42. The neurovascular array of claim 39 wherein said plurality of modes includes a high resolution brain mode in which said interface enables each of said coil elements of said head coil to be interconnected with a separate one of the processing channels of the MR system.

43. The neurovascular array of claim 39 wherein said plurality of modes includes a volume neck mode in which said interface enables each of said other coil elements of said anterior and said posterior coils to be interconnected with a separate one of the processing channels of the MR system.

44. The neurovascular array of claim 39 wherein said plurality of modes includes a spectroscopy mode in which said interface enables all of said coil elements of said head coil to be interconnected with a single one of the processing channels of the MR system.

45. The neurovascular array of claim 39 wherein said interface is capable of enabling said neurovascular array to be selectively operated in said plurality of modes when said coil elements of said head coil, said anterior coil and said posterior coil are greater in number than the processing channels of the MR system.

46. The neurovascular array of claim 39 wherein said preamplifier decoupling scheme involves each of said primary resonant substructures having an input resonant circuit in said short segment of second ring thereof for enabling said primary resonant substructure via a low impedance preamplifier to be (i) operatively couplable to one processing channel of the MR system and (ii) decoupled thereat from the other of said primary resonant substructures.

47. The neurovascular array of claim 46 wherein said low impedance preamplifiers are provided as part of the neurovascular array.

48. The neurovascular array of claim 46 wherein each of said low impedance preamplifiers is provided with one of the processing channels of the MR system.

49. The neurovascular array of claim 46 wherein said offset tuning scheme involves in each of said primary resonant substructures at least one of:

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(a) a tuning circuit in at least one of said rods thereof;

(b) a tuning circuit in said short segment thereof of said first ring; and

(c) a tuning circuit in said short segment thereof of said second ring;

for enabling each of said primary resonant substructures to be tuned so that signal current induced therein is effectively precluded from interfering with neighboring ones of said primary resonant substructures primarily via said first ring and said rods thereby enabling each of said primary resonant substructures (i) to be decoupled thereat from the other of said primary resonant substructures (ii) while maintaining the ability to resonate at an operating frequency of said head coil and thus to receive the magnetic resonance signals.

50. The neurovascular array of claim 39 wherein said plurality of electrically-adjacent primary resonant substructures of said head coil is eight in number, with each being generally deployed 45 degrees apart from its neighbor.

51. The neurovascular array of claim 50 wherein:

(a) a first group of four of said primary resonant substructures have said rods thereof spaced approximately 60 degrees apart in each of said primary resonant substructures; and

(b) a second group of four of said primary resonant substructures have said rods thereof spaced approximately 30 degrees apart in each of said primary resonant substructures;

with said primary resonant substructures of said first and said second groups being deployed in alternating fashion.

52. The neurovascular array of claim 39 wherein each of said rods includes a decoupling network therein for decoupling said head coil from a radio frequency transmit field of the MR system during a transmit cycle thereof.

53. A volume coil for use with a parallel-imaging compatible magnetic resonance (MR) system, the volume coil comprising:

(a) a first electrically conductive ring;

(b) a second electrically conductive ring;

(c) a plurality of rods electrically interconnecting said first and said second rings to form a birdcage-like structure therewith;

wherein said rods and said first and said second rings are configured to produce a plurality of electrically-adjacent primary resonant substructures about the birdcage-like structure, with each of said primary resonant substructures including two of said rods neighboring each other and a corresponding short segment of each of said first and said second rings interconnecting them while electrically sharing one of said rods with each of its neighboring primary resonant substructures, so that said primary resonant substructures are isolated from each other via a preamplifier decoupling scheme and an offset tuning scheme thereby enabling each of said primary resonant substructures (i) to receive magnetic resonance signals from tissue within a separate field of view thereof and (ii) to be operatively couplable to one processing channel of the MR system in order to convey the magnetic resonance signals received thereby (iii) while being simultaneously decoupled from the other of said primary resonant substructures.

54. The volume coil of claim 53 wherein said preamplifier decoupling scheme involves each of said primary resonant substructures having an input resonant circuit in said

short segment of second ring thereof for enabling said primary resonant substructure via a low impedance preamplifier to be (i) operatively couplable to one processing channel of the MR system and (ii) decoupled thereat from the other of said primary resonant substructures.

55. The volume coil of claim 54 wherein said low impedance preamplifiers are provided as part of the volume coil.

56. The volume coil of claim 54 wherein each of said low impedance preamplifiers is provided with one of the processing channels of the MR system.

57. The volume coil of claim 54 wherein said offset tuning scheme involves in each of said primary resonant substructures at least one of:

(a) a tuning circuit in at least one of said rods thereof;

(b) a tuning circuit in said short segment thereof of said first ring; and

(c) a tuning circuit in said short segment thereof of said second ring;

for enabling each of said primary resonant substructures to be tuned so that signal current induced therein is effectively precluded from interfering with neighboring ones of said primary resonant substructures primarily via said first ring and said rods thereby enabling each of said primary resonant substructures (i) to be decoupled thereat from the other of said primary resonant substructures (ii) while maintaining the ability to resonate at an operating frequency of the volume coil and thus to receive the magnetic resonance signals.

58. The volume coil of claim 53 wherein said plurality of electrically-adjacent primary resonant substructures is eight in number, with each being generally deployed 45 degrees apart from its neighbor.

59. The volume coil of claim 58 wherein:

(a) a first group of four of said primary resonant substructures have said rods thereof spaced approximately 60 degrees apart in each of said primary resonant substructures; and

(b) a second group of four of said primary resonant substructures have said rods thereof spaced approximately 30 degrees apart in each of said primary resonant substructures;

with said primary resonant substructures of said first and said second groups being deployed in alternating fashion.

60. The volume coil of claim 53 wherein each of said rods includes a decoupling network therein for decoupling the volume coil from a radio frequency transmit field of the MR system during a transmit cycle thereof.

61. An array for use with a magnetic resonance (MR) system having a plurality of processing channels, the array comprising:

(a) a volume coil including:

(I) a first ring at one end of said volume coil, said first ring being electrically conductive;

(II) a second ring at an other end of said volume coil, said second ring being electrically conductive; and

(II) a plurality of rods electrically interconnecting said first and said second rings to form a birdcage-like structure therewith;

wherein said rods and said first and said second rings are configured to produce a plurality of electrically-adjacent primary resonant substructures about the birdcage-like structure, with each of said primary resonant substructures constituting a coil element including two of said rods neighboring each other and a corresponding short segment of each of said first and said second rings interconnecting them while electrically sharing one of said rods with each of its neighboring primary resonant substructures, so that said primary resonant substructures are isolated from each other via a preamplifier decoupling scheme and an offset tuning scheme thereby enabling each of said primary resonant substructures (i) to receive magnetic resonance signals from tissue within a separate field of view thereof and (ii) to be operatively couplable to one processing channel of the MR system in order to convey the magnetic resonance signals received thereby (iii) while being simultaneously decoupled from the other of said primary resonant substructures;

(b) a secondary coil having at least one other coil element for receiving magnetic resonance signals from tissue within a separate field of view thereof;

(c) a tertiary coil having at least one other coil element for receiving magnetic resonance signals from tissue within a separate field of view thereof; and

(d) an interface for enabling said coil elements of said volume coil, said secondary coil and said tertiary coil to be selectively interconnected to the processing channels of the MR system so that the array can be selectively operated in a plurality of modes.

62. The array of claim 61 wherein:

(a) said volume coil is intended for imaging of a head of a patient;

(b) said secondary coil is intended for imaging carotid structures on one side of a neck of the patient; and

(c) said tertiary coil is intended for imaging carotid structures on an other side of the neck of the patient.

63. The array of claim 61 wherein:

(a) said secondary coil is intended for imaging a heart of a patient from an anterior perspective; and

(b) said tertiary coil is intended for imaging the heart of the patient from a posterior perspective.

64. The array of claim 61 wherein said preamplifier decoupling scheme involves each of said primary resonant substructures having an input resonant circuit in said short segment of second ring thereof for enabling said primary resonant substructure via a low impedance preamplifier to be (i) operatively couplable to one processing channel of the MR system and (ii) decoupled thereat from the other of said primary resonant substructures.

65. The array of claim 64 wherein said low impedance preamplifiers are provided as part of the array.

66. The array of claim 61 wherein said offset tuning scheme involves in each of said primary resonant substructures at least one of:

(a) a tuning circuit in at least one of said rods thereof;

(b) a tuning circuit in said short segment thereof of said first ring; and

(c) a tuning circuit in said short segment thereof of said second ring;

for enabling each of said primary resonant substructures to be tuned so that signal current induced therein is effectively precluded from interfering with neighboring ones of said primary resonant substructures primarily via said first ring and said rods thereby enabling each of said primary resonant substructures (i) to be decoupled thereat from the other of said primary resonant substructures (ii) while maintaining the ability to resonate at an operating frequency of said volume coil and thus to receive the magnetic resonance signals.

67. The array of claim 61 wherein each of said rods includes a decoupling network therein for decoupling said volume coil from a radio frequency transmit field of the MR system during a transmit cycle thereof.

68. A method of making a volume coil for use with a parallel-imaging compatible magnetic resonance (MR) system, the method comprising the steps of:

(a) assembling a first electrically conductive ring and a second electrically conductive ring with a plurality of rods electrically interconnecting said rings to form a birdcage-like structure therewith;

(b) configuring said rods and said first and said second rings to produce a plurality of electrically-adjacent primary resonant substructures about the birdcage-like structure, with each of said primary resonant substructures including two of said rods neighboring each other and a corresponding short segment of each of said first and said second rings interconnecting them; and

(c) isolating said primary resonant substructures from each other via a preamplifier decoupling scheme and an offset tuning scheme so that each of said primary resonant substructures is enabled (i) to receive magnetic resonance signals from tissue within a field of view thereof and (ii) to be operatively couplable to one processing channel of the MR system for conveyance of the magnetic resonance signals received thereby (iii) while being simultaneously decoupled from the other of said primary resonant substructures.

69. The method of claim 68 wherein said preamplifier decoupling scheme involves the step of providing each of said primary resonant substructures with an input resonant circuit in said short segment of second ring thereof for enabling said primary resonant substructure via a low impedance preamplifier to be (i) operatively couplable to one processing channel of the MR system and (ii) decoupled thereat from the other of said primary resonant substructures.

70. The method of claim 69 wherein said offset tuning scheme involves in each of said primary resonant substructures at least one of the steps of:

(a) tuning at least one of said rods thereof;

(b) tuning said short segment thereof of said first ring; and

(c) tuning said short segment thereof of said second ring;

for enabling each of said primary resonant substructures to be tuned so that signal current induced therein is effectively precluded from interfering with neighboring ones of said primary resonant substructures primarily via said first ring and said rods thereby enabling each of said primary resonant substructures (i) to be decoupled thereat from the other of said primary resonant substructures (ii) while maintaining the ability to resonate at an operating frequency of the volume coil and thus to receive the magnetic resonance signals.

71. A method of making a volume coil for use with a parallel-imaging compatible magnetic resonance (MR) system, the method comprising the steps of:

(a) assembling a first electrically conductive ring and a second electrically conductive ring with a plurality of rods electrically interconnecting said rings to form a birdcage-like structure therewith;

(b) configuring said rods and said first and said second rings to produce a plurality of electrically-adjacent primary resonant substructures about the birdcage-like structure, with each of said primary resonant substructures including two of said rods neighboring each other and a corresponding short segment of each of said first and said second rings interconnecting them while electrically sharing one of said rods with each of its neighboring primary resonant substructures; and

(c) providing each of said primary resonant substructures with a source impedance considerably higher than a load impedance to which said primary resonant substructure connects for creating a resonant circuit therewith so as to enable said primary resonant substructure (i) to be operatively couplable to one processing channel of the MR system in order to convey magnetic resonance signals received thereby (ii) while simultaneously being at least partially decoupled from the other of said primary resonant substructures of the volume coil.

72. An interface for coupling a coil array to a parallel-imaging compatible magnetic resonance (MR) system, said coil array including (i) a volume coil having a plurality of electrically-adjacent primary resonant substructures formed in a birdcage-like structure each of which operable for receiving magnetic resonance signals from tissue within a field of view thereof, (ii) a secondary coil having at least one coil element in proximity to said volume coil for receiving magnetic resonance signals from tissue within a field of view thereof and (iii) a

tertiary coil having at least one coil element in proximity to said volume coil for receiving magnetic resonance signals from tissue within a field of view thereof; the interface comprising:

(a) a plurality of input ports for coupling to said primary resonant substructures of said volume coil and said coil elements of said secondary and said tertiary coils; and

(b) a plurality of output ports for coupling to a plurality of processing channels of the MR system; and

(c) an interface circuit for enabling said input ports and said output ports to be selectively interconnected and thereby enable said coil array to be selectively operated in a plurality of modes, with at least one of said modes enabling said volume coil to operate as a parallel-imaging compatible device and at least one other of said modes enabling said volume coil to operate as a single output device capable of mimicking the uniformity of a conventional birdcage-type structure.

73. The interface of claim 72 wherein said plurality of modes includes (I) a neurovascular phased array mode, (II) a high resolution brain mode, (III) a volume neck mode, and (IV) a spectroscopy mode.

74. The interface of claim 73 wherein in said neurovascular phased array mode said interface circuit enables:

(a) each pair of said primary resonant substructures of said volume coil to be interconnected with a separate one of the processing channels of the MR system; and

(b) each of said coil elements of said secondary and said tertiary coils to be interconnected with a separate one of the processing channels of the MR system.

75. The interface of claim 74 wherein said volume coil has eight of said primary resonant substructures and said secondary and said tertiary coils each have two of said coil elements, for use with the MR system equipped with at least eight of the processing channels.

76. The interface of claim 73 wherein in said high resolution brain mode said interface circuit enables each of said primary resonant substructures of said volume coil to be interconnected with a separate one of the processing channels of the MR system.

77. The interface of claim 73 wherein in said volume neck mode said interface circuit enables each of said coil elements of said secondary and said tertiary coils to be interconnected with a separate one of the processing channels of the MR system.

78. The interface of claim 73 wherein in said spectroscopy mode said interface circuit enables all of said primary resonant substructures of said volume coil to be interconnected with a single one of the processing channels of the MR system.

79. A housing for a neurovascular array for use with a magnetic resonance system, the housing comprising:

(a) a head section for housing a head coil of said neurovascular array;

(b) a neck section for housing a neck coil of said neurovascular array;

(c) a C-spine section for housing a C-spine coil of said neurovascular array; and

(d) a base section to which said head, said neck and said C-spine sections attach, with said neck and said C-spine sections attached atop an inferior portion of said base section

and said head section being slideably attached atop a superior portion of said base section so as to enable said head section to be moveable between (i) a closed position wherein said head coil is situated in a phased array relationship with at least one of said neck and said C-spine coils and (ii) an open position wherein said head coil is situated out of said phased array relationship while still allowing at least one mode of operation of said neurovascular array.

80. The housing of claim 79 wherein said head section is slideably attached atop said superior portion of said base section by means of a slide and guide rail assembly.